

FCC Report (5.8G)

Applicant: CanDo International, Inc.

Address of Applicant: 138 E Lemon Ave, Monrovia, CA 91016

Equipment Under Test (EUT)

Product Name: HD DIAGNOSTIC TABLET

Model No.: HD Pro Tab

Trade Mark: CanDo

FCC ID: 2AKNY-IDSPROTAB

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.407:2016

Date of sample receipt: December 16, 2016

Date of Test: December 16-23, 2016

Date of report issued: December 23, 2016

Test Result : PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Robinson Lo
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the GTS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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2 Version

Version No.	Date	Description
00	December 23, 2016	Original

Prepared By:

Edward. Pan

Date:

December 23, 2016

Project Engineer

Check By:

Andy. Wu

Date:

December 23, 2016

Reviewer

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.407(a)(3)	Pass
Channel Bandwidth	15.407(e)	Pass
Power Spectral Density	15.407(a)(3)	Pass
Band Edge	15.407(b)(4)	Pass
Spurious Emission	15.205/15.209/15.407(b)(4)	Pass

Pass: The EUT complies with the essential requirements in the standard.

Remark: Test according to ANSI C63.10:2013 and ANSI C63.4:2014.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	$\pm 4.34\text{dB}$	(1)
Radiated Emission	30MHz ~ 1000MHz	$\pm 4.24\text{dB}$	(1)
Radiated Emission	1GHz ~ 40GHz	$\pm 4.68\text{dB}$	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	$\pm 3.45\text{dB}$	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 Client Information

Applicant:	CanDo International, Inc.
Address of Applicant:	138 E Lemon Ave, Monrovia, CA 91016
Manufacturer:	SHENZHEN FCAR TECHNOLOGY CO., LTD.
Address of Manufacturer:	8F, Chuangyi Bldg., No. 3025, Nanhai Ave., Nanshan, Shenzhen, China
Factory:	SHENZHEN FCAR TECHNOLOGY CO.,LTD
Address of Factory:	West 1F, Bldg. B, Hengchao Industrial Park, Tangtou North Ave., Bao'an, Shenzhen, China

5.2 General Description of EUT

Product Name:	HD DIAGNOSTIC TABLET
Model No.:	HD Pro Tab
Operation Frequency:	802.11a/802.11n(HT20)@5.8G Band: 5745MHz ~ 5825MHz 802.11n(HT40)@ 5.8G Band: 5755MHz ~ 5795MHz
Channel numbers:	802.11a/802.11n(HT20)@5.8G Band: 5 802.11n(HT40)@ 5.8G Band: 2
Channel bandwidth:	802.11a/802.11n(HT20):20MHz 802.11n(HT40):40MHz
Modulation technology:	Orthogonal Frequency Division Multiplexing (OFDM)
Antenna Type:	FPCB antenna
Antenna gain:	1dBi
Power supply:	Adapter Model No.:HNSC050300WX Input: AC 100-240V, 50/60Hz, 0.45A MAX Output: DC 5V, 3A Or DC 3.7V 10000mAh Li-ion Battery

Operation Frequency each of channel @ 5.8G Band							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745MHz	153	5765MHz	155	5775MHz	157	5785MHz
161	5805MHz	165	5825MHz				

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test channel	Frequency (MHz)		
	5.8G Band		
	802.11a 802.11n(HT20)	802.11n(HT40)	
Lowest channel	5745	5755	
Middle channel	5785		
Highest channel	5825	5795	

5.3 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode
<i>Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i>	

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:	
Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.	
Mode	Data rate
802.11a	6Mbps
802.11n(HT20)	6.5Mbps
802.11n(HT40)	13Mbps

5.4 Description of Support Units

None.

5.5 Test Facility

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"> • FCC —Registration No.: 600491 Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, June 22, 2016. • Industry Canada (IC) —Registration No.: 9079A-2 The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. Has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016.

5.6 Test Location

All tests were performed at:
<p>Global United Technology Services Co., Ltd. No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China Tel: 0755-27798480 Fax: 0755-27798960</p>

6 Test Instruments list


Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July 03 2015	July 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June 29 2016	June 28 2017
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June 29 2016	June 28 2017
5	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June 29 2016	June 28 2017
6	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 29 2016	June 28 2017
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	June 29 2016	June 28 2017
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial Cable	GTS	N/A	GTS213	June 29 2016	June 28 2017
10	Coaxial Cable	GTS	N/A	GTS211	June 29 2016	June 28 2017
11	Coaxial cable	GTS	N/A	GTS210	June 29 2016	June 28 2017
12	Coaxial Cable	GTS	N/A	GTS212	June 29 2016	June 28 2017
13	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June 29 2016	June 28 2017
14	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June 29 2016	June 28 2017
15	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 29 2016	June 28 2017
16	Band filter	Amindeon	82346	GTS219	June 29 2016	June 28 2017
17	Power Meter	Anritsu	ML2495A	GTS540	June 29 2016	June 28 2017
18	Power Sensor	Anritsu	MA2411B	GTS541	June 29 2016	June 28 2017

Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.0(L)x3.0(W)x3.0(H)	GTS264	May.16 2014	May.15 2019
2	EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS223	June 29 2016	June 28 2017
3	10dB Pulse Limita	Rohde & Schwarz	N/A	GTS224	June 29 2016	June 28 2017
4	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June 29 2016	June 28 2017
5	LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS226	June 29 2016	June 28 2017
6	Coaxial Cable	GTS	N/A	GTS227	June 29 2016	June 28 2017
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

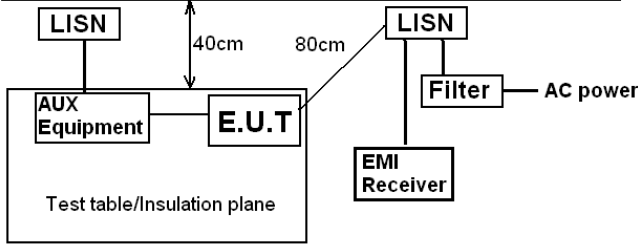
General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	ChangChun	DYM3	GTS257	June 29 2016	June 28 2017

7 Test results and Measurement Data

7.1 Antenna requirement

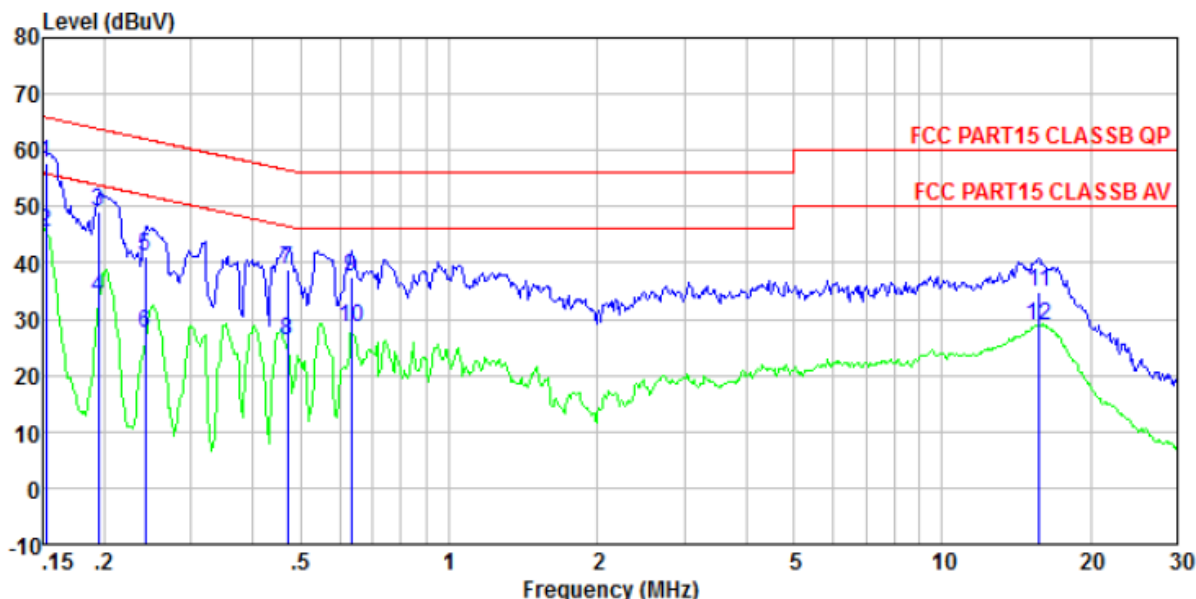
Standard requirement:	FCC Part15 C Section 15.203
<p>15.203 requirement:</p> <p><i>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</i></p>	
E.U.T Antenna:	
<p>The antenna is FPCB antenna, the best case gain of the antenna is 1dBi</p> 	

7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207		
Test Method:	ANSI C63.10:2013		
Test Frequency Range:	150KHz to 30MHz		
Class / Severity:	Class B		
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test setup:	<div><p style="text-align: center;">Reference Plane</p><p style="text-align: center;">Test table/Insulation plane</p><p><i>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</i></p></div>		
Test procedure:	<div><div>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</div><div>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</div><div>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.</div></div>		
Test Instruments:	Refer to section 6.0 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Pass		

Measurement data

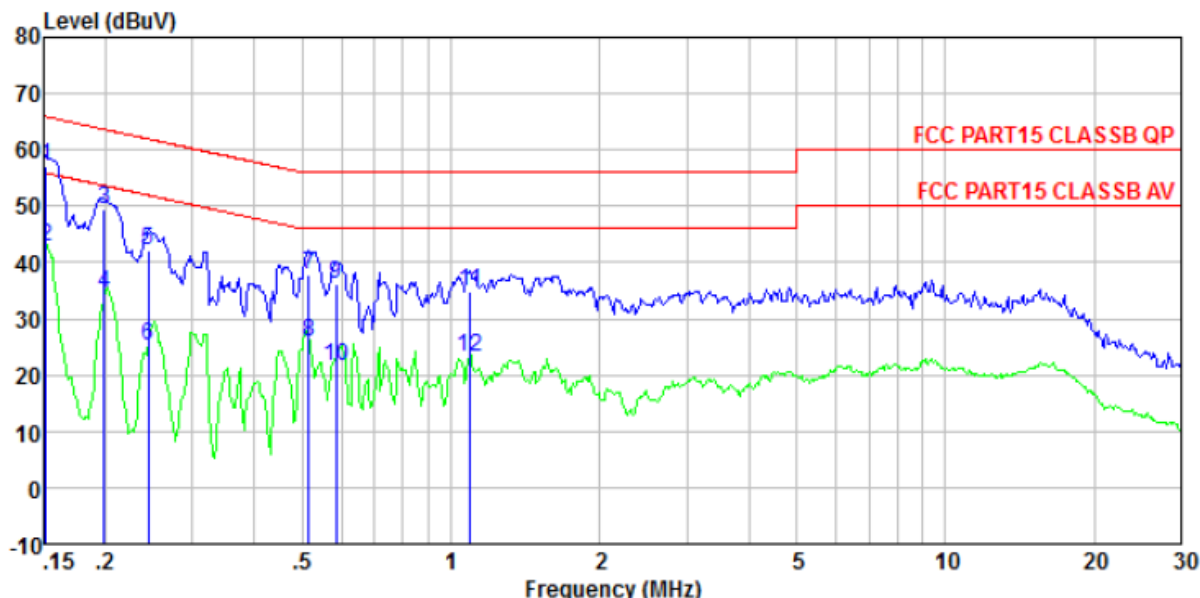
Line:



Site : Shielded room
 Condition : FCC PART15 CLASSB QP LINE
 Job.No : GTS201612000098
 Test mode : 5.8G SRD mode
 Test Engineer: Boy

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.152	57.21	0.42	0.12	57.75	65.87	-8.12	QP
2	0.152	45.02	0.42	0.12	45.56	55.87	-10.31	Average
3	0.194	48.67	0.43	0.13	49.23	63.84	-14.61	QP
4	0.194	33.32	0.43	0.13	33.88	53.84	-19.96	Average
5	0.242	40.63	0.44	0.12	41.19	62.04	-20.85	QP
6	0.242	26.84	0.44	0.12	27.40	52.04	-24.64	Average
7	0.471	38.37	0.39	0.11	38.87	56.49	-17.62	QP
8	0.471	25.64	0.39	0.11	26.14	46.49	-20.35	Average
9	0.634	36.94	0.30	0.13	37.37	56.00	-18.63	QP
10	0.634	28.15	0.30	0.13	28.58	46.00	-17.42	Average
11	15.718	34.53	0.23	0.22	34.98	60.00	-25.02	QP
12	15.718	28.29	0.23	0.22	28.74	50.00	-21.26	Average

Neutral:



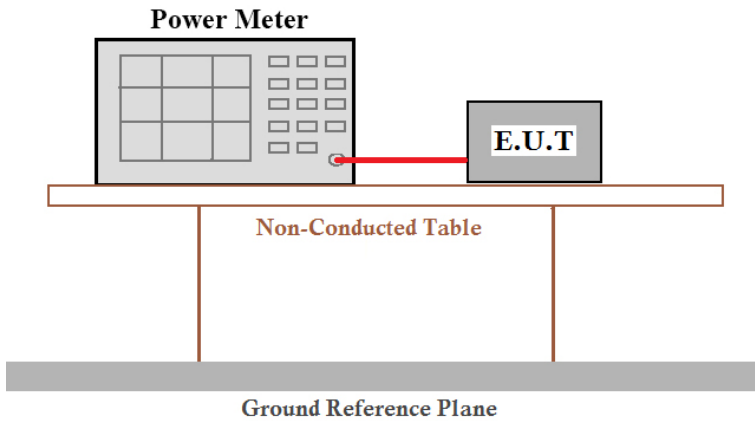
Site : Shielded room
Condition : FCC PART15 CLASSB QP NEUTRAL
Job.No : GTS201612000098
Test mode : 5.8G SRD mode
Test Engineer: Boy

	Read	LISN	Cable		Limit	Over	
Freq	Level	Factor	Loss	Level	Line	Limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.152	56.65	0.41	0.12	57.18	65.91	-8.73 QP
2	0.152	42.43	0.41	0.12	42.96	55.91	-12.95 Average
3	0.199	48.92	0.41	0.13	49.46	63.67	-14.21 QP
4	0.199	33.97	0.41	0.13	34.51	53.67	-19.16 Average
5	0.244	41.62	0.42	0.11	42.15	61.95	-19.80 QP
6	0.244	24.76	0.42	0.11	25.29	51.95	-26.66 Average
7	0.516	37.36	0.34	0.11	37.81	56.00	-18.19 QP
8	0.516	25.57	0.34	0.11	26.02	46.00	-19.98 Average
9	0.585	35.63	0.28	0.12	36.03	56.00	-19.97 QP
10	0.585	21.17	0.28	0.12	21.57	46.00	-24.43 Average
11	1.094	34.38	0.21	0.13	34.72	56.00	-21.28 QP
12	1.094	22.93	0.21	0.13	23.27	46.00	-22.73 Average

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

7.3 Conducted Peak Output Power

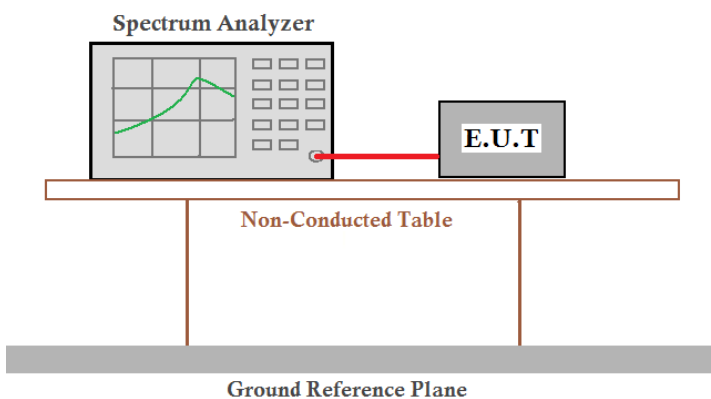
Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	ANSI C63.10:2013 and KDB789033 D02 General UNII Test Procedures New Rules v01
Limit:	30dBm
Test setup:	 <p>The diagram illustrates the test setup. A Power Meter is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Power Meter and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

Test CH	Peak Output Power (dBm)			Limit(dBm)	Result
	802.11a	802.11n(HT20)	802.11n(HT40)		
Lowest	10.17	9.75	7.34	30.00	Pass
Middle	10.72	9.71	---		
Highest	10.21	9.53	6.99		

Remark: “---” is not applicable

7.4 Channel Bandwidth

Test Requirement:	FCC Part15 E Section 15.407(e)
Test Method:	ANSI C63.10:2013 and KDB789033 D02 General UNII Test Procedures New Rules v01
Limit:	>500KHz
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

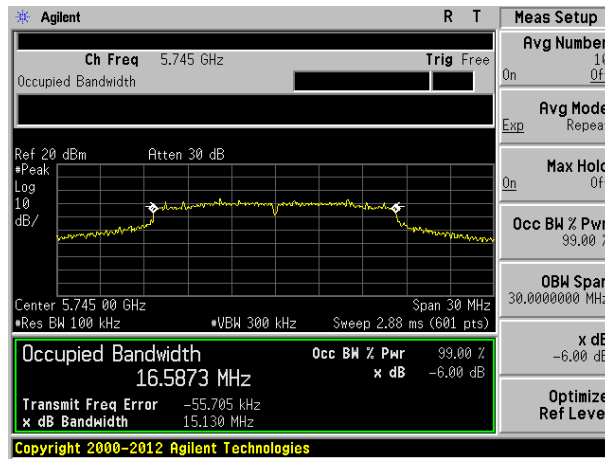
Measurement Data

Test CH	Channel Bandwidth (MHz)			Limit(KHz)	Result
	802.11a	802.11n(HT20)	802.11n(HT40)		
Lowest	15.130	13.926	35.134	>500KHz	Pass
Middle	13.860	13.908	---		
Highest	15.560	15.156	32.319		

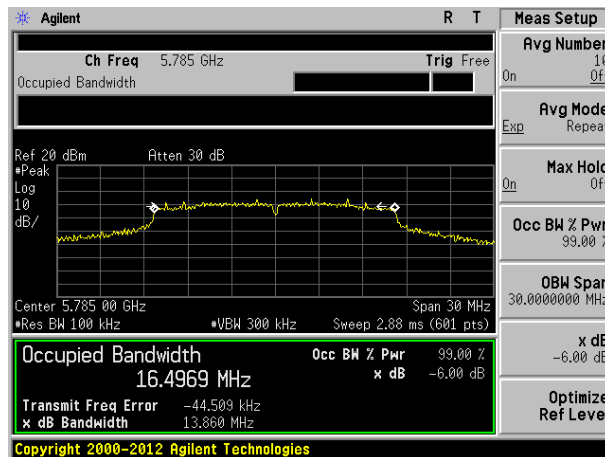
Remark: “---” is not applicable

Test plot as follows:

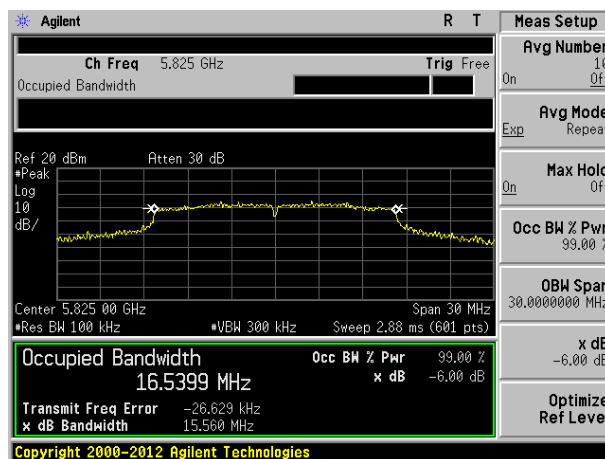
Test mode: 802.11a



Lowest channel

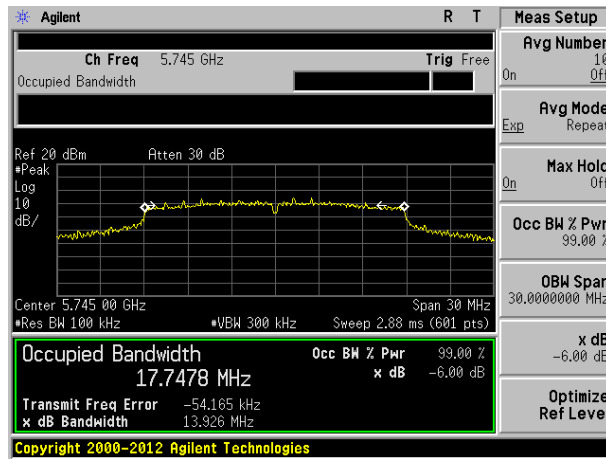


Middle channel

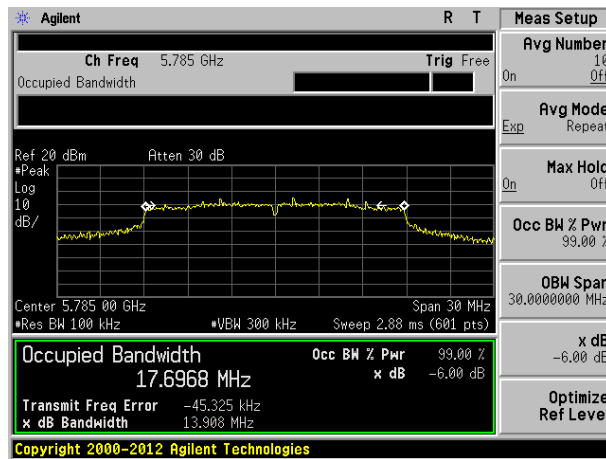


Highest channel

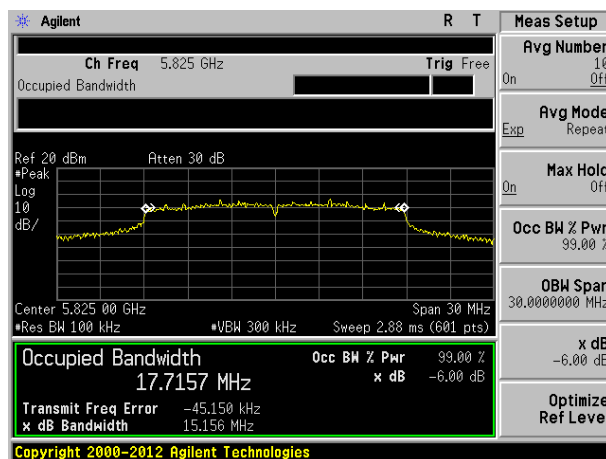
Test mode: 802.11n(HT20) @ 5.8G Band



Lowest channel

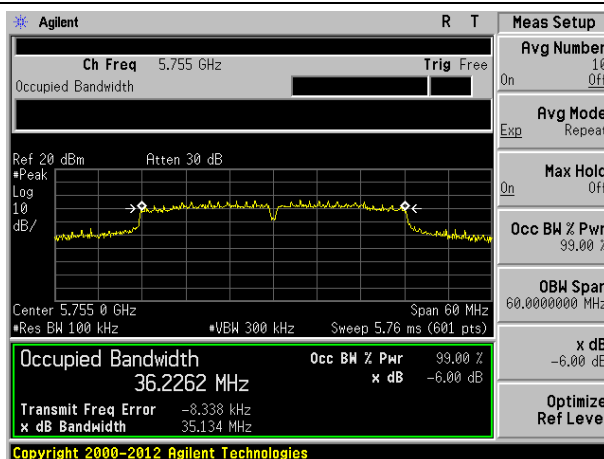


Middle channel

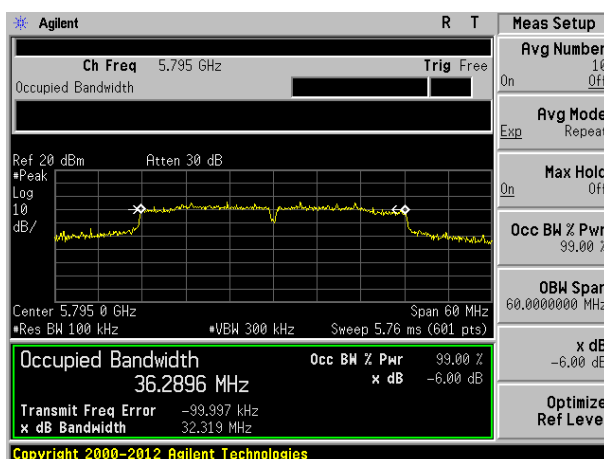


Highest channel

Test mode: 802.11n(HT40) @ 5.8G Band

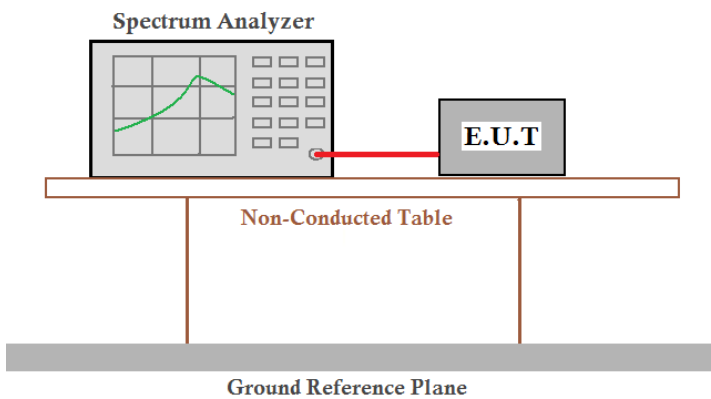


Lowest channel



Highest channel

7.5 Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	ANSI C63.10:2013 and KDB789033 D02 General UNII Test Procedures New Rules v01
Limit:	30dBm
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

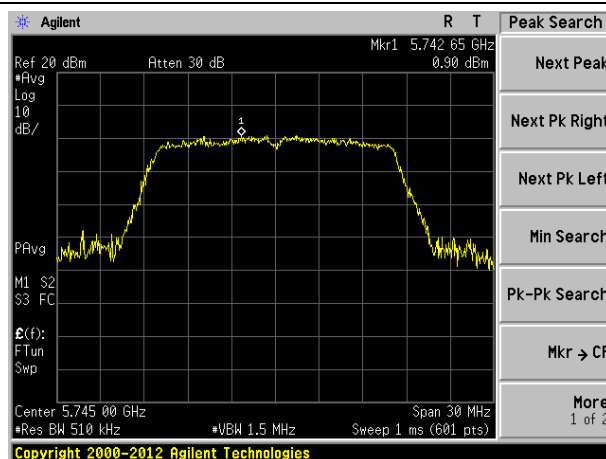
Measurement Data

Test CH	Channel Bandwidth (MHz)			Limit(dBm)	Result
	802.11a	802.11n(HT20)	802.11n(HT40)		
Lowest	0.90	-0.19	-3.39	30.00	Pass
Middle	0.81	0.18	---		
Highest	0.43	-0.31	-3.38		

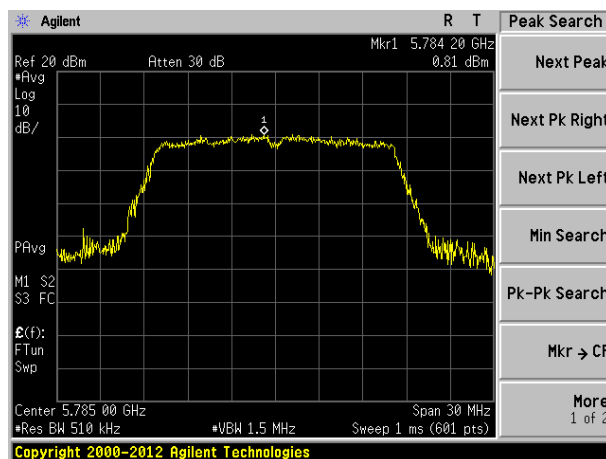
Remark: "---" is not applicable

Test plot as follows:

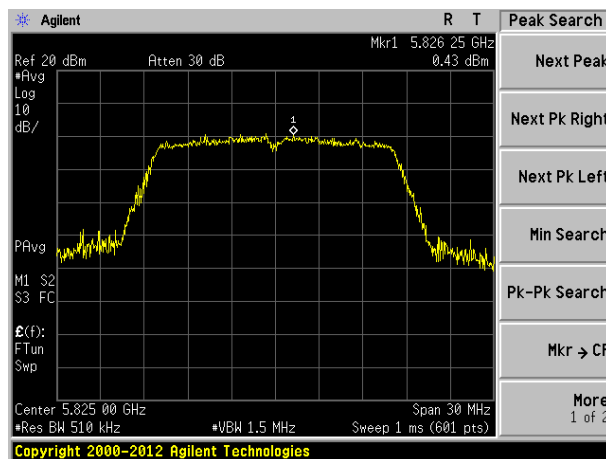
Test mode: 802.11a



Lowest channel

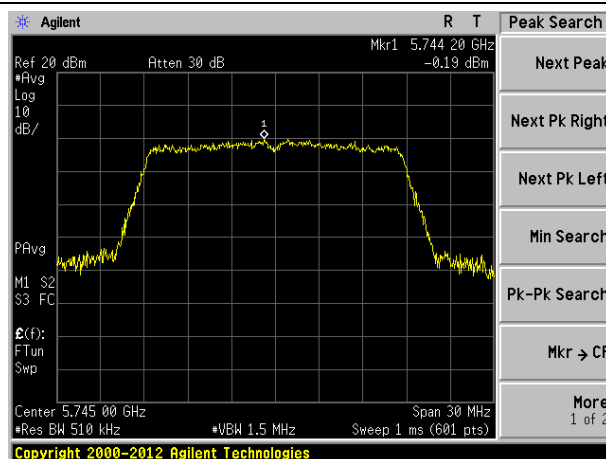


Middle channel

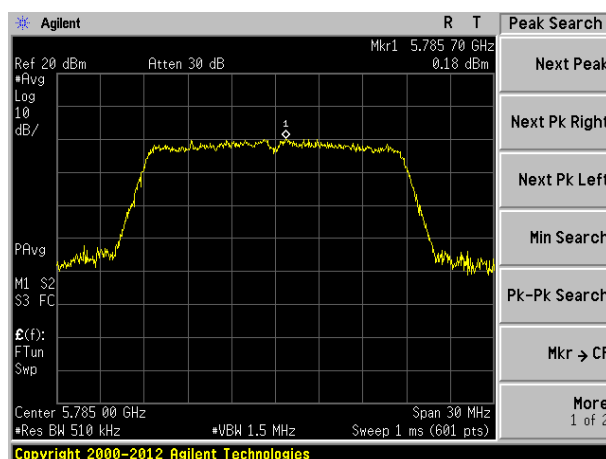


Highest channel

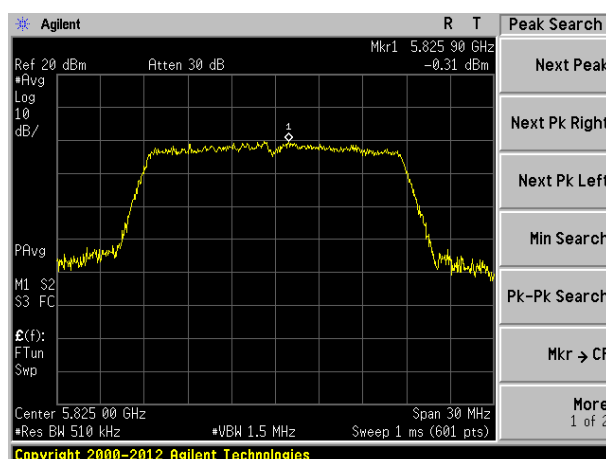
Test mode: 802.11n(HT20) @ 5.8G Band



Lowest channel

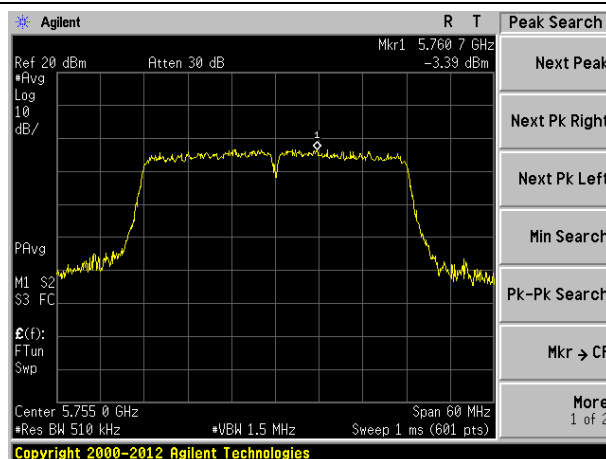


Middle channel

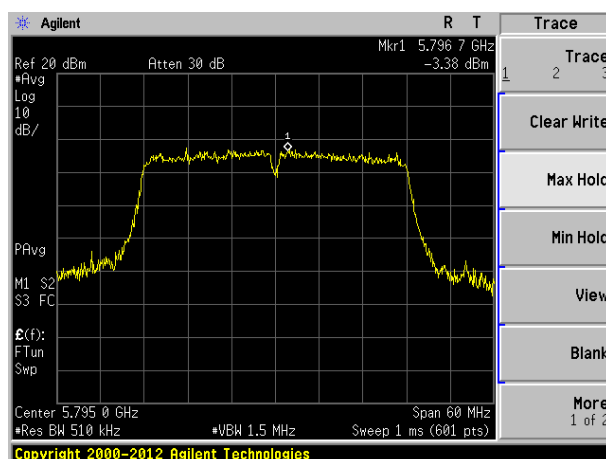


Highest channel

Test mode: 802.11n(HT40) @ 5.8G Band



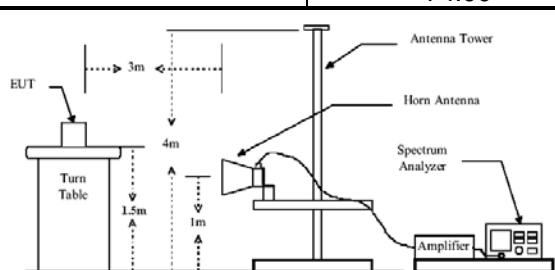
Lowest channel



Highest channel

7.6 Band edges

7.6.1 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.10: 2013				
Test Frequency Range:	30MHz to 40GHz, only worse case is reported				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Limit:	Frequency		Limit (dBuV/m @3m)		Value
	Above 1GHz		54.00		Average
			74.00		Peak
Test setup:					
Test Procedure:	<div>1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</div> <div>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</div> <div>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</div> <div>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</div> <div>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</div> <div>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</div> <div>7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.</div>				
Test Instruments:	Refer to section 6.0 for details				
Test mode:	Refer to section 5.3 for details				
Test results:	Pass				

Measurement data:

Remark: The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.

Test mode:	802.11a	Test channel:	Lowest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	40.84	32.68	9.97	23.86	59.63	68.20	-8.57	Horizontal
5741.35	82.99	32.56	9.86	23.85	101.56	N/A	N/A	Horizontal
5725.00	41.68	32.68	9.97	23.86	60.47	68.20	-7.73	Vertical
5741.35	84.72	32.56	9.86	23.85	103.29	N/A	N/A	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	26.61	32.68	9.97	23.86	45.40	48.20	-2.60	Horizontal
5741.35	72.99	32.56	9.86	23.85	91.56	N/A	N/A	Horizontal
5725.00	26.84	32.68	9.97	23.86	45.63	48.20	-2.57	Vertical
5741.35	75.54	32.56	9.86	23.85	94.11	N/A	N/A	Vertical

Test mode:	802.11a	Test channel:	Highest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5826.20	79.65	32.68	9.97	23.86	98.44	N/A	N/A	Horizontal
5850.00	40.32	32.70	9.99	23.87	59.14	68.20	-9.06	Horizontal
5826.20	83.78	32.68	9.97	23.86	102.57	N/A	N/A	Vertical
5850.00	42.06	32.70	9.99	23.87	60.88	68.20	-7.32	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5826.20	70.32	32.68	9.97	23.86	89.11	N/A	N/A	Horizontal
5850.00	26.26	32.70	9.99	23.87	45.08	48.20	-3.12	Horizontal
5826.20	74.65	32.68	9.97	23.86	93.44	N/A	N/A	Vertical
5850.00	26.21	32.70	9.99	23.87	45.03	48.20	-3.17	Vertical

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test mode:	802.11n(HT20) @ 5.8G Band	Test channel:	Lowest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	40.59	32.68	9.97	23.86	59.38	68.20	-8.82	Horizontal
5742.19	82.45	32.56	9.86	23.85	101.02	N/A	N/A	Horizontal
5725.00	39.65	32.68	9.97	23.86	58.44	68.20	-9.76	Vertical
5742.19	84.29	32.56	9.86	23.85	102.86	N/A	N/A	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	26.49	32.68	9.97	23.86	45.28	54.00	-2.92	Horizontal
5742.19	73.60	32.56	9.86	23.85	92.17	N/A	N/A	Horizontal
5725.00	26.54	32.68	9.97	23.86	45.33	54.00	-2.87	Vertical
5742.19	75.09	32.56	9.86	23.85	93.66	N/A	N/A	Vertical

Test mode:	802.11n(HT20) @ 5.8G Band	Test channel:	Highest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5826.20	80.20	32.68	9.97	23.86	98.99	N/A	N/A	Horizontal
5850.00	41.02	32.70	9.99	23.87	59.84	74.00	-8.36	Horizontal
5826.20	84.06	32.68	9.97	23.86	102.85	N/A	N/A	Vertical
5850.00	40.33	32.70	9.99	23.87	59.15	74.00	-9.05	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5826.20	72.36	32.68	9.97	23.86	91.15	N/A	N/A	Horizontal
5850.00	26.57	32.70	9.99	23.87	45.39	54.00	-2.81	Horizontal
5826.20	75.69	32.68	9.97	23.86	94.48	N/A	N/A	Vertical
5850.00	26.68	32.70	9.99	23.87	45.50	54.00	-2.70	Vertical

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test mode:	802.11n(HT40) @ 5.8G Band	Test channel:	Lowest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	38.79	32.68	9.97	23.86	57.31	68.20	-10.89	Horizontal
5745.00	75.04	32.56	9.86	23.85	93.61	N/A	N/A	Horizontal
5725.00	37.86	32.68	9.97	23.86	56.38	68.20	-11.82	Vertical
5745.00	84.53	32.56	9.86	23.85	103.10	N/A	N/A	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	26.25	32.68	9.97	23.86	45.04	48.20	-3.16	Horizontal
5745.00	68.98	32.56	9.86	23.85	87.55	N/A	N/A	Horizontal
5725.00	26.33	32.68	9.97	23.86	45.12	48.20	-3.08	Vertical
5745.00	75.04	32.56	9.86	23.85	93.61	N/A	N/A	Vertical

Test mode:	802.11n(HT40) @ 5.8G Band	Test channel:	Highest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5784.88	81.95	32.68	9.97	23.86	100.74	N/A	N/A	Horizontal
5850.00	40.32	32.70	9.99	23.87	59.14	68.20	-9.06	Horizontal
5784.88	83.65	32.68	9.97	23.86	102.44	N/A	N/A	Vertical
5850.00	41.59	32.70	9.99	23.87	60.41	68.20	-7.79	Vertical

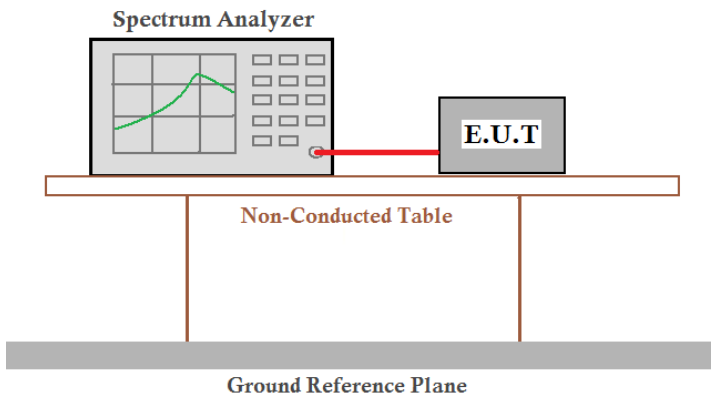
Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5784.88	72.95	32.68	9.97	23.86	91.74	N/A	N/A	Horizontal
5850.00	26.59	32.70	9.99	23.87	45.41	48.20	-2.79	Horizontal
5784.88	73.64	32.68	9.97	23.86	92.43	N/A	N/A	Vertical
5850.00	26.29	32.70	9.99	23.87	45.11	48.20	-3.09	Vertical

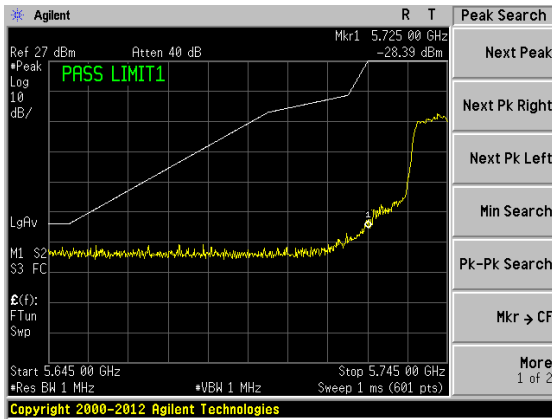
Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

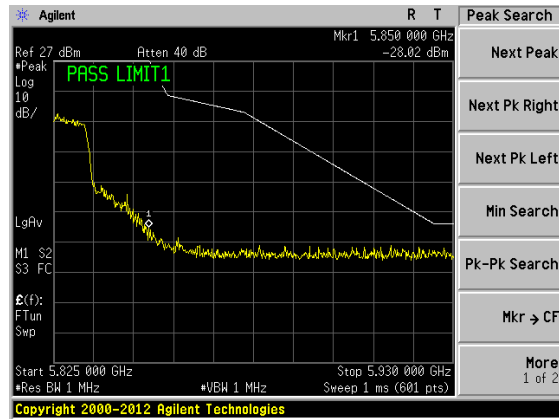
7.6.2 Conducted Measurement Method

Test Requirement:	FCC Part15 E Section 15.407(b)(4)
Limit:	All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by two vertical legs and sits on a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Test mode: 802.11a

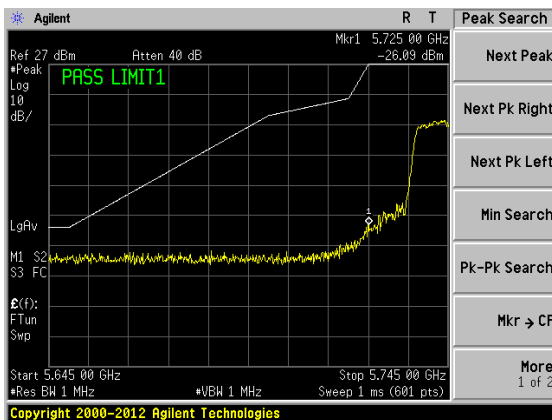


Lowest channel

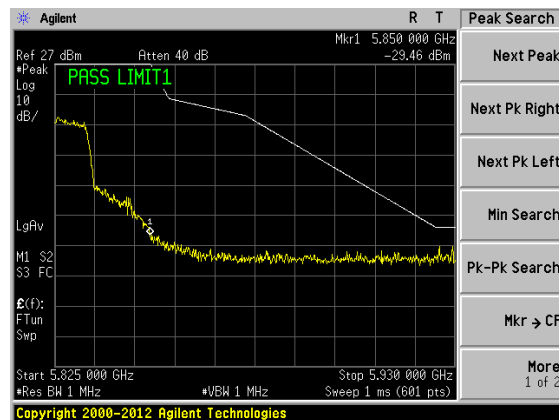


Highest channel

Test mode: 802.11n(HT20)

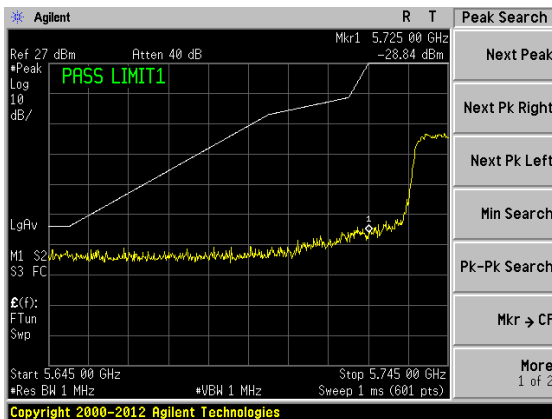


Lowest channel

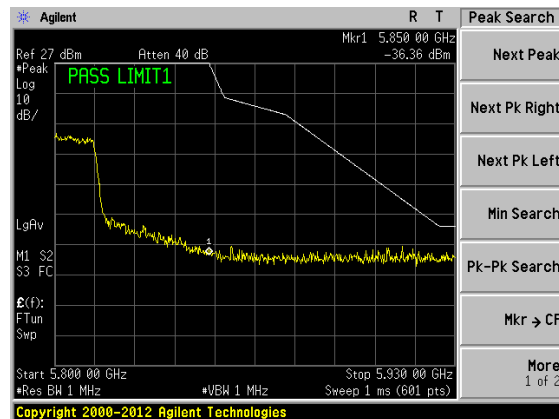


Highest channel

Test mode: 802.11n(HT40)



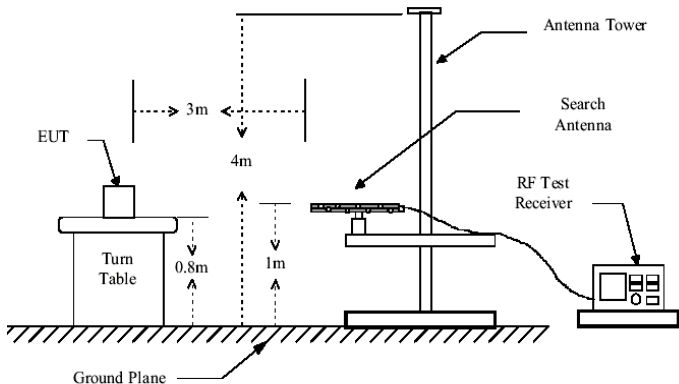
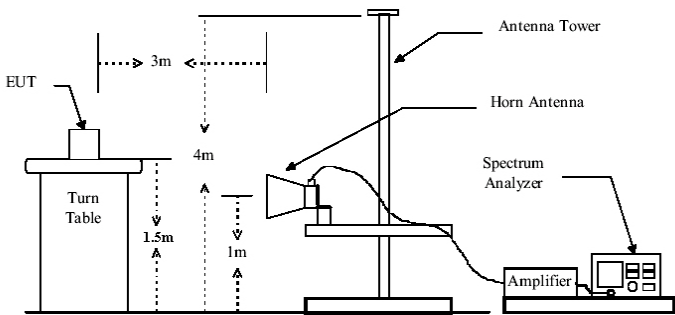
Lowest channel



Highest channel

7.7 Spurious Emission

7.7.1 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209, Part 15E Section 15.407(b)(4)				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	30MHz to 40GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	1MHz	3MHz	Average Value
Limit:	Frequency		Limit (dBuV/m @3m)		Remark
	30MHz-88MHz		40.0		Quasi-peak Value
	88MHz-216MHz		43.5		Quasi-peak Value
	216MHz-960MHz		46.0		Quasi-peak Value
	960MHz-1GHz		54.0		Quasi-peak Value
	Frequency		Limit (dBm/MHz)		Remark
	Above 1GHz		-27.0		Peak Value
Test setup:	Below 1GHz				
					
Test setup:	Above 1GHz				
					
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below				

	<p>1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</p> <p>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</p> <p>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</p> <p>7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Remark:

According to KDB 789033 D02V01 section G) 1) (d), for For measurements above 1000 MHz @ 3m distance, the limit of field strength is computed as follows:

$$E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2;$$

For example, if EIRP = -27dBm

$$E[\text{dBuV/m}] = -27 + 95.2 = 68.2\text{dBuV/m}.$$

Measurement Data

■ Below 1GHz

Only the data of worst case at each channel plan (nominal bandwidth =20MHz, 40MHz, 80MHz) is reported.

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
36.38	41.48	14.68	0.62	30.06	26.72	40.00	-13.28	Vertical
52.58	46.81	15.14	0.79	29.98	32.76	40.00	-7.24	Vertical
155.36	54.01	10.48	1.60	29.38	36.71	43.50	-6.79	Vertical
194.45	54.69	12.56	1.81	29.22	39.84	43.50	-3.66	Vertical
248.55	50.99	14.07	2.12	29.63	37.55	46.00	-8.45	Vertical
280.02	48.90	14.67	2.27	29.86	35.98	46.00	-10.02	Vertical
64.43	46.28	12.84	0.90	29.89	30.13	40.00	-9.87	Horizontal
173.21	54.75	11.16	1.70	29.30	38.31	43.50	-5.19	Horizontal
219.85	50.23	13.17	1.96	29.39	35.97	46.00	-10.03	Horizontal
299.32	53.02	15.03	2.35	30.00	40.40	46.00	-5.60	Horizontal
359.19	52.80	16.40	2.67	29.69	42.18	46.00	-3.82	Horizontal
410.38	40.32	17.26	2.91	29.48	31.01	46.00	-14.99	Horizontal

■ Above 1GHz

Test mode:		802.11a			Test channel:		lowest	
Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Over limit(dB)	Detector	
V	11510.00	28.63	21.64	50.27	54(Note3)	-3.73	PK	
V	17265.00	26.36	21.80	48.16	54(Note3)	-5.84	PK	
H	11510.00	26.43	21.83	48.26	54(Note3)	-5.74	PK	
H	17265.00	25.23	21.67	46.90	54(Note3)	-7.10	PK	

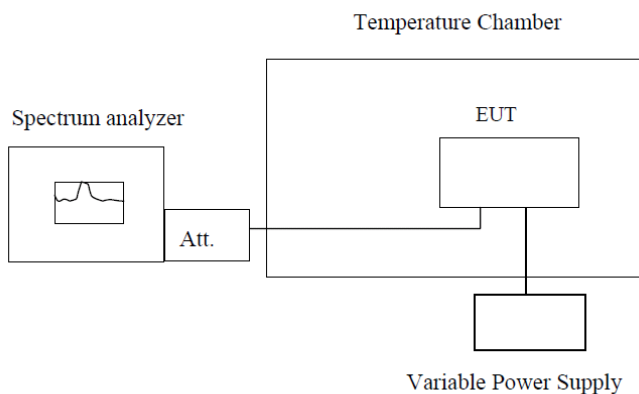
Test mode:		802.11a			Test channel:		Middle	
Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Over limit(dB)	Detector	
V	11570.00	28.02	21.67	49.69	54(Note3)	-4.31	PK	
V	17355.00	26.63	21.83	48.46	54(Note3)	-5.54	PK	
H	11570.00	27.16	21.67	48.83	54(Note3)	-5.17	PK	
H	17355.00	26.43	21.83	48.26	54(Note3)	-5.74	PK	

Test mode:		802.11a			Test channel:		Highest	
Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Over limit(dB)	Detector	
V	11650.00	28.72	21.67	50.39	54(Note3)	-3.61	PK	
V	17475.00	26.85	21.83	48.68	54(Note3)	-5.32	PK	
H	11650.00	27.88	21.67	49.55	54(Note3)	-4.45	PK	
H	17475.00	28.45	21.83	50.28	54(Note3)	-3.72	PK	

Note:

1. Measure Level = Reading Level + Factor.
2. The test trace is same as the ambient noise (the test frequency range: 18GHz~40GHz), therefore no data appear in the report.
3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

7.8 Frequency stability

Test Requirement:	FCC Part15 C Section 15.407(g)
Test Method:	ANSI C63.10:2013, FCC Part 2.1055
Limit:	Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified
Test Procedure:	The EUT was setup to ANSI C63.4, 2003; tested to 2.1055 for compliance to FCC Part 15.407(g) requirements.
Test setup:	 <p>Note : Measurement setup for testing on Antenna connector</p>
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement data:

802.11a					
Frequency stability versus Temp.					
Power Supply: DC 3.7V					
Temp. (°C)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
-30	5745	5743.8318	5744.3531	5741.7389	5743.5388
	5785	5783.6029	5782.7220	5782.4867	5783.8293
	5825	5822.6967	5821.2348	5824.8414	5823.1438
-20	5745	5742.5234	5743.3403	5744.9316	5744.0949
	5785	5784.9199	5782.4148	5784.4803	5784.6468
	5825	5823.3533	5823.9791	5824.8734	5824.1109
-10	5745	5743.8596	5741.7166	5744.1032	5744.8046
	5785	5782.5906	5781.3505	5784.3286	5784.3055
	5825	5824.1470	5821.4779	5824.9460	5824.1067
0	5745	5744.3504	5743.6458	5744.7419	5744.5636
	5785	5784.4731	5782.9593	5783.0247	5783.2463
	5825	5822.4833	5823.5963	5824.9390	5824.3477
10	5745	5744.0846	5742.8412	5742.6233	5744.0601
	5785	5782.4940	5782.5655	5782.9200	5784.6451
	5825	5824.6194	5823.7811	5824.6730	5824.4316
20	5745	5741.6632	5744.0099	5744.8962	5743.3219
	5785	5784.8326	5781.9454	5784.5551	5784.2602
	5825	5822.9328	5822.7598	5822.5716	5822.7609
30	5745	5744.7858	5743.0077	5744.9816	5744.6115
	5785	5782.5915	5781.4691	5784.4282	5784.1903
	5825	5823.6022	5824.8679	5824.4114	5824.4928
40	5745	5744.6321	5743.2798	5743.6538	5742.3862
	5785	5783.0204	5781.0680	5784.9609	5784.7580
	5825	5823.3424	5821.7964	5823.8215	5824.8661
50	5745	5743.6212	5742.3795	5744.1566	5744.4834
	5785	5782.3128	5783.3268	5783.7422	5782.7443
	5825	5824.6274	5823.0377	5824.6826	5824.9489

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VDC)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
3.3	5745	5742.9697	5742.9407	5744.2563	5744.2511
	5785	5782.6152	5782.0072	5783.6949	5782.0761
	5825	5824.7549	5821.9438	5821.6516	5824.9287
3.7	5745	5741.6469	5742.4645	5741.0701	5743.8568
	5785	5782.7327	5782.3473	5783.1023	5783.0011
	5825	5823.3101	5823.5824	5824.7955	5823.3828
4.1	5745	5742.8067	5743.8142	5742.5775	5742.0507
	5785	5782.3728	5784.8863	5781.2999	5783.3656
	5825	5822.6525	5824.2399	5821.4558	5824.5270

802.11n(HT20)					
Frequency stability versus Temp.					
Power Supply: DC 3.7V					
Temp. (°C)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
-30	5745	5747.1831	5744.0791	5743.8392	5747.6476
	5785	5787.8606	5784.1531	5784.9883	5786.2674
	5825	5826.5761	5824.4130	5824.1687	5825.7440
-20	5745	5746.1278	5744.4113	5744.1864	5745.0187
	5785	5786.4484	5784.2721	5784.2555	5785.0800
	5825	5826.2159	5824.2760	5824.7351	5825.1737
-10	5745	5746.2677	5744.6409	5744.8054	5745.7360
	5785	5786.4707	5784.0945	5784.6409	5785.0802
	5825	5825.0749	5824.7369	5824.8799	5825.1125
0	5745	5745.1347	5744.7821	5744.6471	5745.1468
	5785	5785.3047	5784.7186	5784.6649	5785.0604
	5825	5825.5638	5824.9283	5824.9426	5825.9464
10	5745	5745.4768	5744.6509	5744.1867	5745.9674
	5785	5785.3392	5784.3451	5784.5157	5785.4826
	5825	5825.8280	5824.0321	5824.9598	5825.9144
20	5745	5745.6986	5744.4618	5744.8449	5745.9975
	5785	5785.3428	5784.0467	5784.1711	5785.5595
	5825	5825.4090	5824.1521	5824.4610	5825.5034
30	5745	5745.8296	5744.1480	5744.8846	5745.0212
	5785	5785.5027	5784.5652	5784.4321	5785.9987
	5825	5825.7772	5824.0329	5824.3295	5825.8521
40	5745	5745.1937	5744.1119	5744.6948	5745.0000
	5785	5785.7968	5784.2090	5784.3656	5785.7887
	5825	5825.2010	5824.6806	5824.4360	5825.5698
50	5745	5745.1314	5744.2320	5744.6569	5745.2404
	5785	5785.6502	5784.6345	5784.2466	5785.7259
	5825	5825.3476	5824.9718	5824.2413	5825.2820

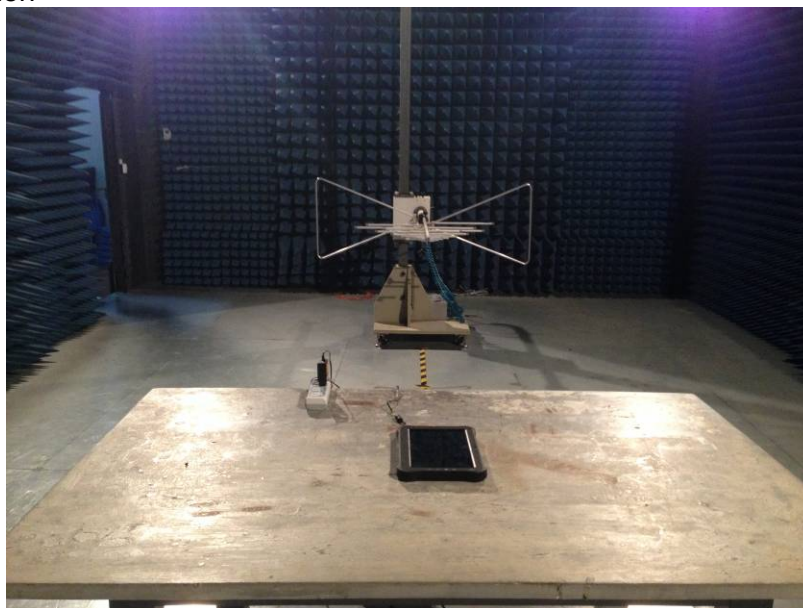
Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VDC)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
3.3	5745	5746.0904	5746.3360	5742.9903	5742.8481
	5785	5786.3293	5785.8849	5783.4552	5782.7035
	5825	5826.0635	5825.4156	5823.4353	5823.8786
3.7	5745	5745.8840	5745.6587	5743.5913	5744.9804
	5785	5785.2044	5785.2523	5784.7018	5784.2023
	5825	5825.9223	5825.9469	5824.5435	5824.3932
4.1	5745	5745.6551	5745.2407	5744.9952	5744.7619
	5785	5785.5886	5785.9816	5784.0202	5784.7582
	5825	5825.7821	5825.4295	5824.8829	5824.1427

802.11n(HT40)					
Frequency stability versus Temp.					
Power Supply: DC 3.7V					
Temp. (°C)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
-30	5755	5755.1329	5752.4902	5752.5891	5756.6263
	5795	5795.2137	5793.7152	5793.5203	5795.3105
-20	5755	5755.6319	5754.8676	5753.2213	5755.0104
	5795	5795.7663	5794.6590	5794.8174	5795.7312
-10	5755	5755.6278	5754.9203	5754.2304	5755.5256
	5795	5795.7221	5794.6044	5794.3056	5795.8709
0	5755	5755.5288	5754.6872	5754.4579	5755.3716
	5795	5795.7172	5794.9227	5794.7460	5795.9256
10	5755	5755.5756	5754.2690	5754.2862	5755.1002
	5795	5795.7922	5794.3509	5794.5067	5795.9406
20	5755	5755.1327	5754.1988	5754.7427	5755.5750
	5795	5795.0588	5794.7198	5794.5410	5795.2590
30	5755	5755.8855	5754.1674	5754.6243	5755.2351
	5795	5795.5299	5794.6309	5794.8600	5795.4906
40	5755	5755.2026	5754.1414	5754.9928	5755.2602
	5795	5795.5569	5794.6045	5794.2624	5795.4861
50	5755	5755.0579	5754.3564	5754.4280	5755.2255
	5795	5795.5597	5794.6965	5794.9078	5795.2017

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VDC)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
3.3	5755	5757.5518	5753.4138	5755.7250	5754.0061
	5795	5797.8966	5794.2689	5795.1343	5794.0550
3.7	5755	5757.1491	5754.8147	5755.9939	5754.1053
	5795	5796.3155	5794.1233	5795.8679	5794.2409
4.1	5755	5755.3833	5754.5111	5755.6131	5754.7150
	5795	5795.0137	5794.6585	5795.2969	5794.4971

8 Test Setup Photo

Radiated Emission



Conducted Emission



9 EUT Constructional Details

Reference to the test report No. GTS201612000098F01

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